



## SHOULDER-BELT-PORITION GUIDING ASSEMBLY

### CROSS REFERENCE TO RELATED APPLICATIONS

- 5 This is a divisional application of the US-serial number 09/554,463 related to an international application number PCT/DE98/03270 (WO 99/24294, European Patent EP 1 037 773 B1, German Patent DE 197 49 780 C2) filed Nov. 10, 1998.

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention:

- 10 It is an object of the present invention to provide more comfortable and convenient seat belts of a transport system (motor vehicle, ship, train or aeroplane), and to enhance the survival chance in the event of any accident (front-, side-, rear-end collision and/or rollover or pile up/mass collision) or during in-flight turbulence.

#### 2. Discussion of the Prior Art:

- 15 It is known in the prior art to provide for seat belts of the transport system D-rings, attached to the post sections (pillars, pillar portions) and non-height-adjustable shoulder belt deflectors, attached to the seat backrests.

- Under constraint of great deformation of the post section, in which an extending belt portion of the seat belt, equipped with a belt retractor 13, having a clamping device, is arranged (Fig. 1), the shoulder belt portion, loosely guided by a conventional height-adjustable D-ring 12, strangulates the neck of the belted passenger and/or injures the aorta of his neck in real-world side-crashes, causing instant death.

Passengers with a height of less than 1.5 m or more than 2 m feel uncomfortable, wearing seat belts, due to the limitation of the height-adjustment of the D-ring 12.

- 25 Passenger, wanting to use the seat belt 1, must make an effort to grasp the main latch plate 9, when in resting position behind the seat backrest 3.2.

- Ref. to US No. 5,570,933 both the shoulder belt portion of the three-point seat belt, loosely guided by the shoulder belt deflector, the height of which cannot be adjusted and which is attached to a top and side edge of the seat backrest, and the lap belt portion are attached to the post section. This shoulder-belt deflector with fixed height is uncomfortable for a passenger of extreme body proportion, when using the seat belt.

### SUMMARY OF THE INVENTION

- 35 Accordingly, the principle object of the present invention is to provide for passengers of a transport system shoulder-belt-portion guiding assemblies for more convenience and enhanced survival chance of passengers in the event of an accident or during in-flight turbulence as well as to resolve the above-mentioned shortcomings.

- A second object of the present invention resides in a cost-, space-saving integration of a height-adjustable shoulder-belt deflector, a head rest and the shoulder-belt-portion of a three- or multi-point seat belt into the shoulder-belt-portion guiding assembly.

## INDUSTRIAL APPLICABILITY

It should be apparent that the invention provides substantially more convenience and greater survival chance including the following features:

- a) Use of the height-adjustable shoulder-belt deflector **5b** (**Fig. 3**) or of the shoulder belt deflector **5** (**Fig. 1**), each upper portion of which is projected through the top edge of the seat backrest, makes the conventional height-adjustable D-ring **12**, attached to the B-, C-, D-post section, shown in **Fig. 1**, unnecessary.
- b) In another embodiment the shoulder-belt deflector **5a** (**Fig. 2**) can be rigidly attached to the head rest **3.6a** as well as to one of the head-rest tubes **5.10** or the shoulder-belt deflector **5b** if replacing the aperture **5.9**.
- c) Any adjustment of the height of the head rest **3.6a** to the head automatically adjusts the height of the shoulder-belt deflector to the shoulder. This feature differs from the D-ring ref. to DE 40 10 452 A1, which is in contact with the shoulder belt, when the passenger is thrown forward, and is moved up to intercept the head, when the passenger is thrown backward. If the belt deflector **5** is not height-adjustable but movable, it can be connected to vibration-dampening energy absorbers, ref. to US-serial number 09/554,464 (EP 1 037 771 B1, DE 197 58 478 C2, CA pending patent 2,347,040), which absorb energy and dampen vibration when the shoulder belt portion moves it up.
- d) The tragedy, linked to neck-strangulation, above-mentioned, is, to a great extent, averted by the shoulder-belt deflector in conjunction with a feature of arranging the extending belt portion and the belt retractor in the seat backrest and arranging the belt end of the lap belt to the seat frame.
- e) For the convenience of the passenger, when stepping out, the shoulder-belt deflector intercepts and loosely retains the released main latch plate **9**, which is loosely held by a main-latch-plate adaptor (not drawn) fastened to the lap belt portion. He or another passenger, when taking the seat and wanting to use the seat belt, easily accesses the released main latch plate on the shoulder-belt deflector. See an alternative feature for easy access thereof, undermentioned.

## BRIEF DESCRIPTION OF THE DRAWINGS

A number of embodiments, other advantages and features of the present invention will be described in the accompanying drawings with reference to the xyz global coordinate system:

**Fig. 1** is a perspective view of a seat with buckle assemblies attached to the seat backrest and seat cushion as well as of a 1st embodiment of a height-adjustable shoulder-belt deflector **5** and a three- or multi-point seat belt **1**, having a main latch plate **9**, which, when the seat belt is used, is inserted and plug-in connected to a main buckle assembly **9.1**

**Fig. 2** is a perspective view of a 2nd embodiment of a shoulder belt deflector **5a** on a head rest having a pair of head-rest tubes **5.10**.

**Fig. 3** is a perspective view of a 3rd embodiment of a height-adjustable belt deflector **5b** having a locking handle **5.2**.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

The advantages of the preferred embodiments in the Chap. "INDUSTRIAL APPLICABILITY" are outlined hereinafter with regard to the functions and features thereof.

5 A three-point seat belt consists of a shoulder, lap and extending belt portion. A multi-point seat belt **1** consists of a first and second shoulder belt portion **1.1**, **1.2**, a lap belt portion **1.3** and an extending belt portion **1.4** (**Fig. 1**).

In the 1st to 3rd embodiment the passenger can unlock a locking member of a locking handle **5.2** to adjust the height of „ $\Delta h$ ” of the shoulder-belt deflector **5b**, provided with a belt-guiding member, which is an aperture **5.9**, by which the shoulder belt portion **1.2** is loosely guided. Finally, the shoulder-belt deflector **5b** at the appropriate height is locked by that locking member. When the shoulder-belt deflector **5**, **5b** is exploited as a single head-rest tube, fastened to the head rest **3.6a** it must have a feature of nonrotating in an opening of the seat-backrest frame about a longitudinal axis of the opening. Conventional head rest has two stiff head-rest tubes **5.10** (**Fig. 2**), moveable in the seat-backrest frame, guided thereby and locked therein. Alternatively, the shoulder-belt deflector **5a** (**Fig. 2**), serving as a belt-guiding member, can be attached either to the head rest **3.6a** or to the head-rest tube **5.10** or to the upper portion of the shoulder-belt deflector **5a**.

When a head rest of fixed height (**Fig. 3**) is integrated in the seat of, for example, a Volvo, a Ferrari or a Porsche, a space-saving, height-adjustable shoulder-belt deflector **5b** can always be installed in either side (free region) **3.22** of the seat backrest **3.2**.

When the height-adjustable head rest is adjusted to the height of a head of any passenger, the shoulder-belt deflector with the shoulder belt portion adapts itself to his body proportion.

As the alternative feature for easy access of the released main latch plate **9**, it, loosely retained by a main-latch-plate adaptor (not drawn) fastened to the lap belt portion, is positioned in resting position at the height of, for example, the elbow of the sitting passenger when the belt retractor **13** retracts the shoulder belt portion through the shoulder-belt deflector. The main-latch-plate adaptor can be a snap-in clip, which, made of a plastic material, consists of two pieces, a stud of one of which is inserted through the lap belt portion and into an opening of the other and snap-in engaged therewith, as known in the art.

Although the present invention has been described and illustrated in detail, it is clearly understood that the terminology used is intended to describe rather than limit. Many more objects, embodiments, features and variations of the present invention are possible in light of the above-mentioned teachings. Therefore, within the spirit and scope of the appended claims, the present invention may be practised otherwise than as specifically described and illustrated.

8. The shoulder-belt-portion guiding assembly according to claim 1, wherein the shoulder-belt deflector (**5, 5b**), guided by a seat-backrest frame and movable therein, has an upper portion, which, projected through a top edge of the seat backrest, is provided with a belt-guiding member, by which the shoulder belt portion is loosely guided; and  
5 a locking handle (**5.2**), having a locking member, which, when unlocked, allows the belt-guiding member with the shoulder belt portion to be adapted to the body proportion of the passenger.

9. The shoulder-belt-portion guiding assembly according to claim 8, wherein the belt-guiding member is an aperture (**5.9**).

10 10. The shoulder-belt-portion guiding assembly according to claim 8, wherein the belt-guiding member is a shoulder-belt deflector (**5a**).

11. The shoulder-belt-portion guiding assembly according to claim 8, wherein the height-adjustable shoulder-belt deflector (**5b**), movable in an opening of the seat-backrest frame, guided thereby and locked therein, is nonrotating about a longitudinal axis of the opening.

15 12. The shoulder-belt-portion guiding assembly according to claim 11, wherein the shoulder-belt deflector, exploited as a single head-rest tube, is made of a material with a high tensile strength and an end portion of the upper portion is attached to the head rest.

13. The shoulder-belt-portion guiding assembly according to claim 12, wherein the belt-guiding member is an aperture (**5.9**).

20 14. The shoulder-belt-portion guiding assembly according to claim 12, wherein the belt-guiding member is a shoulder-belt deflector (**5a**).

15. The shoulder-belt-portion guiding assembly according to claim 8, wherein upon non-use of the seat belt a main latch plate, movable along the shoulder belt portion or a lap belt portion up to a main-latch-plate adaptor, fastened to the lap belt portion, is released from a main  
25 buckle assembly, where the passenger, wanting to use the seat belt, easily accesses the released main latch plate, positioned between the shoulder-belt deflector and the main-latch-plate adaptor.

16. The shoulder-belt-portion guiding assembly according to claim 8, wherein upon non-use of the seat belt a main latch plate, movable along the shoulder belt portion or a lap belt portion up to a main-latch-plate adaptor, fastened to the lap belt portion, is released from a main  
30 buckle assembly, where the passenger, wanting to use the seat belt, easily accesses the released main latch plate, which, loosely retained by the main-latch-plate adaptor, is positioned at a height of an elbow.

17. The shoulder-belt-portion guiding assembly according to claim 15, wherein the adaptor  
35 is a snap-in clip, consisting of two pieces, a stud of one of which is inserted through the belt portion and into an opening of the other and snap-in engaged therewith.

18. The shoulder-belt-portion guiding assembly according to claim 16, wherein the adaptor is a snap-in clip, consisting of two pieces, a stud of one of which is inserted through the belt portion and into an opening of the other and snap-in engaged therewith.

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